a first electrode interposed between said first plate and said membrane electrolyte, said first electrode comprising a first substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a first electrochemically active area; and

a second electrode interposed between said second separator plate and said membrane electrolyte, said second electrode comprising a substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a second electrochemically active area;

A1

said electrochemical fuel cell assembly further comprising a first reactant flow path for directing a first reactant fluid stream between said first and second ports, wherein said first reactant flow path extends substantially linearly across said first electrochemically active area, and a fluid transport property of said first electrode substrate varies as it is traversed in-plane in the direction of said first reactant flow path, and wherein said first electrode is a cathode.

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8. (Amended) The electrochemical fuel cell assembly of claim 1 wherein the density of said first electrode substrate increases as it is traversed in-plane in the direction of said first reactant flow path.

A2

9. (Amended) The electrochemical fuel cell assembly of claim 1 wherein the porosity of said first electrode substrate increases as it is traversed in-plane in the direction of said first reactant flow path.

10. (Amended) The electrochemical fuel cell assembly of claim 1 wherein the pore size of said first electrode substrate increases as it is traversed in-plane in the direction of said first reactant flow path.

Kindly add the following new claims 20-28:

20. (New) An electrochemical fuel cell assembly comprising:

a first separator plate having a pair of oppositely facing major planar surfaces, and first and second ports;

a second separator plate having a pair of oppositely facing major planar surfaces, and third and fourth ports;

a membrane electrolyte interposed between said first and second separator plates;

a first electrode interposed between said first plate and said membrane electrolyte, said first electrode comprising a first substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a first electrochemically active area; and

A3

a second electrode interposed between said second separator plate and said membrane electrolyte, said second electrode comprising a substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a second electrochemically active area;

said electrochemical fuel cell assembly further comprising a first reactant flow path for directing a first reactant fluid stream between said first and second ports, wherein said first reactant flow path extends substantially linearly across said first electrochemically active area, and the material composition of the electrocatalyst associated with said first electrode substrate varies as said electrode is traversed in-plane in the direction of said first reactant flow path.

21. (New) The electrochemical fuel cell assembly of claim 20 wherein the material composition of said electrocatalyst varies substantially symmetrically as said electrode is traversed in-plane in the direction of said first reactant flow path.

22. (New) An electrochemical fuel cell assembly comprising:

a first separator plate having a pair of oppositely facing major planar surfaces, and first and second ports;

a second separator plate having a pair of oppositely facing major planar surfaces, and third and fourth ports;

a membrane electrolyte interposed between said first and second separator plates;

a first electrode interposed between said first plate and said membrane electrolyte, said first electrode comprising a first substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a first electrochemically active area; and

A_3

a second electrode interposed between said second separator plate and said membrane electrolyte, said second electrode comprising a substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a second electrochemically active area;

said electrochemical fuel cell assembly further comprising a first reactant flow path for directing a first reactant fluid stream between said first and second ports, wherein said first reactant flow path extends substantially linearly across said first electrochemically active area, and the structure of said first electrode varies substantially symmetrically as the electrochemically active area thereof is traversed in-plane in the direction of said first reactant flow path.

23. (New) An electrochemical fuel cell assembly comprising:

a first separator plate having a pair of oppositely facing major planar surfaces, and first and second ports;

a second separator plate having a pair of oppositely facing major planar surfaces, and third and fourth ports;

a membrane electrolyte interposed between said first and second separator plates;

a first electrode interposed between said first plate and said membrane electrolyte, said first electrode comprising a first substrate having a pair of oppositely facing major planar

surfaces and electrocatalyst associated therewith defining a first electrochemically active area; and

a second electrode interposed between said second separator plate and said membrane electrolyte, said second electrode comprising a substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a second electrochemically active area;

said electrochemical fuel cell assembly further comprising a first reactant flow path for directing a first reactant fluid stream between said first and second ports, wherein said first reactant flow path extends substantially linearly across said first electrochemically active area, and a fluid transport property of said first electrode substrate varies substantially symmetrically as the electrochemically active area thereof is traversed in-plane in the direction of said first reactant flow path.

A3

24. (New) An electrochemical fuel cell assembly comprising:

a first separator plate having a pair of oppositely facing major planar surfaces, and first and second ports;

a second separator plate having a pair of oppositely facing major planar surfaces, and third and fourth ports;

a membrane electrolyte interposed between said first and second separator plates;

a first electrode interposed between said first plate and said membrane electrolyte, said first electrode comprising a first substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a first electrochemically active area; and

a second electrode interposed between said second separator plate and said membrane electrolyte, said second electrode comprising a substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a second electrochemically active area;

said electrochemical fuel cell assembly further comprising a first reactant flow path for directing a first reactant fluid stream between said first and second ports, wherein said first reactant flow path extends substantially linearly across said first electrochemically active

area, and the material composition of said first electrode substrate varies substantially symmetrically as the electrochemically active area thereof is traversed in-plane in the direction of said first reactant flow path.

25. (New) The electrochemical fuel cell assembly of claim 24 wherein said first electrode substrate comprises a coating on one of said major planar surfaces thereof, and the loading of said coating varies as the electrochemically active area of said first substrate is traversed in-plane in the direction of said first reactant flow path.

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27. (New) The electrochemical fuel cell assembly of claim 26 wherein said coating comprises an ion-conducting polymer, and the equivalent weight of said polymer coating varies as the electrochemically active area of said first substrate is traversed in-plane in the direction of said first reactant flow path.

28. (New) An electrochemical fuel cell assembly comprising:

a first separator plate having a pair of oppositely facing major planar surfaces, and first and second ports;

a second separator plate having a pair of oppositely facing major planar surfaces, and third and fourth ports;

a membrane electrolyte interposed between said first and second separator plates;

a first electrode interposed between said first plate and said membrane electrolyte, said first electrode comprising a first substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a first electrochemically active area; and

a second electrode interposed between said second separator plate and said membrane electrolyte, said second electrode comprising a substrate having a pair of oppositely facing major planar surfaces and electrocatalyst associated therewith defining a second electrochemically active area;

A3

said electrochemical fuel cell assembly further comprising a first reactant flow path for directing a first reactant fluid stream between said first and second ports, wherein said first reactant flow path extends substantially linearly across said first electrochemically active area, and the loading of said electrocatalyst varies substantially symmetrically as said electrode is traversed in-plane in the direction of said first reactant flow path.